Developing a microfluidic device for *in situ* water column profiling of phototrophic sulfur bacteria

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Phototrophic purple sulfur bacteria are crucial to study in Biogeochemistry because they are thought to be one of the first organisms to utilize photosynthesis. In the early atmosphere, there was very little oxygen present. Sulfur bacteria use light and sulfides as energy in anoxic conditions. Conditions suitable for sulfur bacteria can be found in anoxic lakes, which many are located in northern Indiana and the Pacific Northwest. The main goal of this project was to design and create a device that could record data and abstract samples of purple sulfur bacteria in anoxic lakes. In order to create this device, we first had to test the purple sulfur bacteria's light absorbance using a spectrophotometer. The data collected about the sulfur bacteria's absorbance was used by us to optimize our design for the circuit which incorporated the LED and Photo-detector components. Also, a Thermosensor component was added in an attempt to determine the optimal temperature sulfur bacteria lives in. Overall, six Op-amps were used in order to limit the amount of noise and to convert current into voltage so temperature and light absorbance can be measured.

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